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ORIGINAL ARTICLES.

RECENT RESEARCHES INTO THE HISTO-PATHOLOGY OF TRACHOMA.[1]

BY ADOLF ALT, M.D., ST. LOUIS, MO.

AMONG the many hitherto unfathomed eye diseases which repeatedly have been the subject of the ardent labor and ceaseless research of almost every worker in the field of histo-pathology of the eye, trachoma takes one of the foremost places.

Its frequency as well as its important position among the diseases of the eye, which is enhanced by its deleterious sequels, must needs again and again arouse the desire to fathom its real cause and, perhaps, in this way to help in its prevention or cure.

My own researches in this direction date as far back as 1876, when I inoculated rabbits' eyes with trachoma. I was perfectly successful in producing a disease which apparently differed in no way from the real trachoma. However, this disappeared again under my eyes in the course of from one to two weeks. I have some of the old specimens still and what I had succeeded in producing in the rabbit's conjunctiva differs

[1] Read before the Third Annual Meeting of the Western Ophthalmological and Oto-Laryngological Association, held at Chicago, Ill., April 7–8, 1898

histologically in no way from the disease in the human conjunctiva. Leber has had the same experience.

After a lapse of years I again took up the study of this subject on quite a considerable amount of material which I gained by excising trachoma granules and cutting them into sections. All I learned in this way, however, by studying sections only and without the finer staining methods of more modern times, was, that the trachoma granule must be looked upon as a miliary lymphoma of the conjunctiva. (See AMERICAN JOURNAL OF OPHTHALMOLOGY, Vol. III, No. 6, page 161). Later on, when persuing bacteriological studies, I again took up this subject with a view to finding the microbes which had been described by Koch, Sattler, and others, as the specific causes of this disease. Like others, however, I have been unable to find them. It seems, that, although microbes may cause the disease, the present means are not sufficient to detect them and to this day researches in this direction have proven fruitless.

About a year ago, being made somewhat familiar with the modern methods of blood examination by differential staining by my friend, Dr. L. Bremer, the idea struck me that the same method of smearing out the fresh trachoma granules like the blood specimens might, perhaps, enable me to learn something more than sections of the hardened material had been able to teach me. This method, indeed, offers immense advantages over any other. I can not find any indication that others have used this same method, and while I neither claim any priority nor want to appropriate to myself what others may have seen, nor feel that my researches have been brought to a satisfactory conclusion, I thought it might interest you to hear and see what I have been able to find. I further want to state right here, that I made these researches before being acquainted with those of Leber (Report of the Heidelberg Ophthalmological Society for 1896, p. 156) which were not yet published, nor with those of Vil ard (*Archives d'Ophtalmologie*, May and June, 1896) which latter had in some way escaped my notice. The results I wish to detail, are, therefore, absolutely original with me, although I now know, that these two authors have reached similar results, however, by, as far as I know, different methods of examination. In this, then, our separate and independent labors support each other.

I shall, in the following, first detail my own methods and

results and then compare them with those of others. I have, in the course of about a year, for this purpose, squeezed out every trachoma granule and many follicles in follicular conjunctivitis which came under my observation, whether they lay superficially, or, as in old cases, buried in the depth of the tissue. This fresh material I smeared out between two slides and allowed it to dry in the air. Some of these slides I then stained without any further procedure. Some I hardened in formol, some in alcohol, some in alcohol and ether, some in boiling

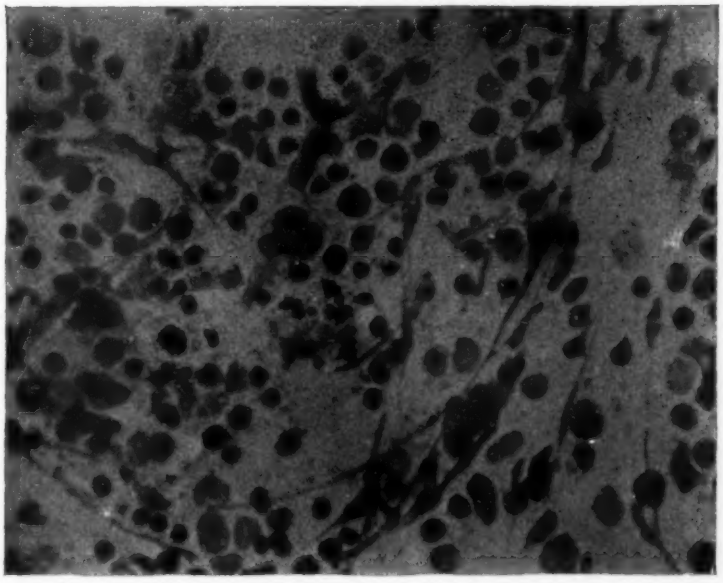

FIG. 1.

alcohol and ether, and another larger series I heated to from 120 to 140° after the method of Ehrlich; most of them I simply drew a few times through an alcohol flame before staining. The results did not seem to be materially altered by these different methods. As staining materials I have used a great variety of aniline dyes, hæmatoxyline and eosine. The best staining I obtained by the differential stains composed of several colors. Among these Dr. L. Bremer's methylene-blue-eosine mixture (Limbeck, *Klin. Pathologie des Blutes*, 1896, p. 26, and *Centlblt. f. Med. Wissenschaften*, 1894, No. 49) which I

was in the fortunate position to receive from the inventor himself, easily holds the first place. Staining by Aldehoff's method (Limbeck, page 22) and with hæmatoxyline and eosine come next. For certain purposes, especially for photographing, Bismark-brown is, perhaps, the best stain. (See Fig. 1).

The first impression gained when examining such a specimen is indeed bewildering. There seems to be a perfect chaos of threads and round cells. At first I was decidedly struck by the threads which take up the staining material like nuclei which undergo a regressive metamorphosis. It soon became

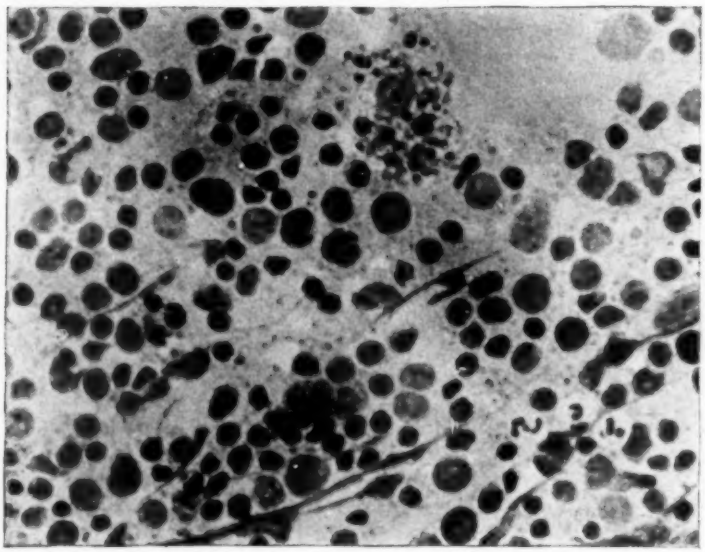

FIG. 2.

apparent that many of these threads are connected at one end with large bodies which are frequently larger and some even considerably larger than the nuclei of the epithelial cells of the conjunctiva. These bodies vary extremely in form, some being round, some oval, some spindle-, pear-, or club-shaped, while others again have totally irregular outlines. The larger, however, they are the less of the staining material they take up. The more diaphanous, sago-like the granule, the more of these threads and bodies, either attached to them or lying loosely around, are found. I venture the opinion that in this material we have to deal with nuclei having undergone a mu-

coid degeneration. To be sure, no longer can there any nucleus or nucleus-like substance be demonstrated within them. They are perfectly homogeneous or they show a fine granulation, some contain vacuoles. (See Fig. 2).

Next to these threads my attention was attracted by a large number of round or oval cells of varying size, sometimes quite small, sometimes as large and larger than the nuclei of the epithelial cells of the conjunctiva, in which single aniline dyes and thionin, made visible one, two, three, sometimes even four small, eccentrically situated, round bodies, like nucleoli. Their similarity to nuclei deprived of protoplasma was

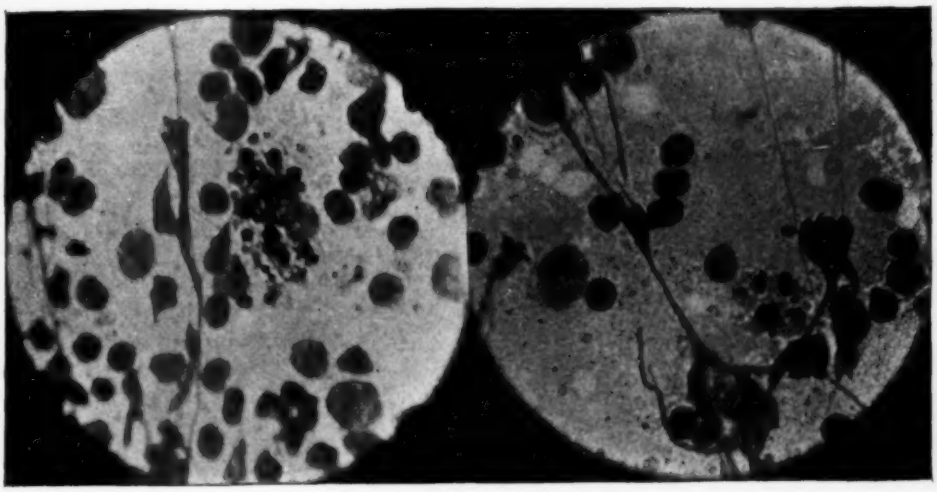

FIG. 3.

so great that I looked upon them as the remains of destroyed epithelial cells. Then, I thought that they might, perhaps, be a vegetable parasite similar to the yeast-plant. Comparison with this plant, however, showed at once, that the idea was erroneous. Whenever I stained specimens differentially with two dyes, such cells did not appear. I must, therefore, assume, that their true nature is not revealed by the single staining.

Double stains make it plain that the vast majority of the round cells composing the granule are lymphocytes. Their protoplasma usually forms but a small ring, often with a slight thickening at one pole, around a large nucleus which stains

much lighter and which seems to be, therefore, undergoing a regressive metamorphosis. Between these lymphocytes lie a varying number of mononuculear leukocytes, but frequently, also, leukocytes with a polymorphous nucleus, which is often seen to be divided into three, four and five portions. Though nothing unusual, I mention this fact for reasons which will appear later on. Cells showing karyokinesis are not wanting, but rare.

Whatever stain is used, the observer must be struck by the very different amount of stain the different cells of which the granule is composed, take up. Especially with Bismark-brown and with hæmatoxyline, is this apparent. With hæmatoxyline and eosine a large number of cells is especially deeply stained in such a manner that an oval or round dark-blue nucleus is seen with but a small amount of red protoplasma at one pole, sometimes protruding tongue-like for some distance. Such cells also vary extremely as to size. (See Fig. 3).

When following up these curious deeply stained cell forms and searching for their origin, I came upon an immense cell with a large, pale nucleus, in the protoplasm of which were embedded smaller and larger bodies which were in part very deeply stained. While these bodies seemed sometimes to simply lie embedded in the granular protoplasma of such a cell, in others they were surrounded by a clear space. In other similar cells clear spaces seemed to indicate where such bodies had formerly been enclosed. Since my attention was first drawn to these peculiar cells, I have never missed them and I am satisfied that they are more frequent in recent than in older granules. While they are in some specimens rarer, in others they are extremely numerous.

The bodies embedded in these cells appear with some stains like round bodies with a piece eaten out, while with other stains it becomes clear that they are mostly spherical, or nearly so, but that only a smaller or larger portion of them, which is sometimes semi lunar or band-like in shape, sometimes round like a nucleus, takes on a deep stain, while the remainder is much more lightly colored. Sometimes there are but a few such bodies in such a cell, sometimes their number is so great as to make it impossible to count them. Frequently larger deeply stained round bodies are seen lying close to this large cell and by their whole

appearance give the impression that they are just such bodies which have grown larger and are in the act of leaving or have left their former abode. Sometimes I have found only a mass of such bodies lying together near a very pale large nucleus, the protoplasma enclosing them had evidently disappeared. (See Fig. 4).

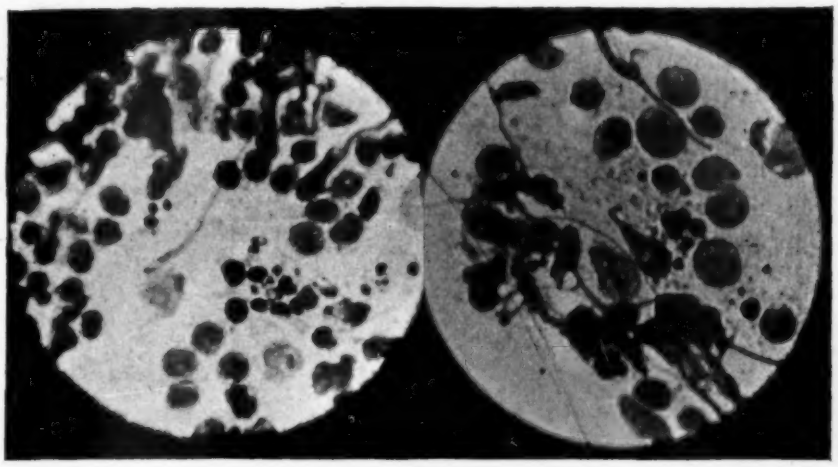

FIG. 4.

The idea that these cells are a transformation of leukocytes, I gave up almost as soon as I conceived it, because there were no connecting links. I know that similar cells have been described by Hoyer in lymphatic glands, but I do not know whether they are identical. The more I have studied these bodies the more I am impressed with the fact, that they must play an important rôle in the histology of trachoma. The more I searched for them and their derivates between the other round cells of the granule, the more cellular forms I found, which I think are such bodies enlarged and, I believe, that the cells with the small amount of protoplasma lying only at the pole, mentioned before, are the oldest forms of these bodies. (See Fig. 5).

It is, of course, impossible to prove it, yet, I am of the opinion, that it is not at all unlikely that in these bodies we may have to deal with an organism which is the cause of the trachoma granule. That they play an important rôle in its

formation can, I think, not be doubted. I think, they are the trachoma parasite.

What, however, these enormous cells are in which they are at first embedded and where these come from, is a question which is not easily settled. These cells and their nucleus resemble epithelial cells most, but I have not found any cell containing these bodies, so far, which was undoubtedly an epithelial cell, neither have I found them more than once or twice in the scraped off epithelium. (See Fig. 6).

FIG. 5.

Aside from the larger round cells, the cells containing these strange bodies, and the cells and nuclei which are evidently undergoing mucoid degeneration, there are innumerable very small round and oval bodies everywhere, some of which take up the stains but very slightly, while others stain darkly, and which are, perhaps, to be looked upon as cell detritus.

I wish to state here, that contrary to other observers, I have never seen any reticulum, nor any connective tissue fibres or cells between the round cells of which the granule is composed. Another strange fact is, that although I have a number of injected specimens, which show that the trachoma granules are pervaded by numerous blood vessels, and although I have in

many a fresh specimen, put on the slide without any pressure, seen undoubted channels filled with blood—in none of these smear specimens have I come across any tissue which could be claimed as that of blood vessel walls. Yet, every specimen contains many erythrocytes. It is, therefore, probable, that, as it is known to be the case in sarcomata, the blood in the granules is not contained in distinct blood vessel walls, but rather circulates in clefts in the tissue without other walls than the cells of the granule themselves.

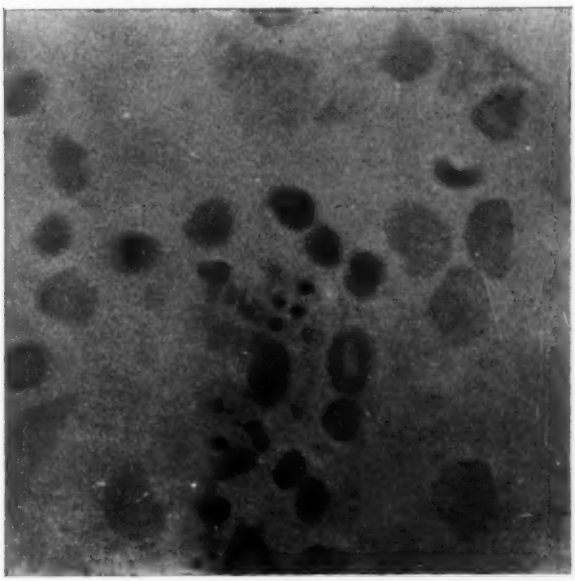

FIG. 6.

So much I wish to relate concerning my own observations.

Villard, who seems to have studied the histology of the trachoma granule by means of sections of the hardened material only (*Archives d'Ophtalmologie*, 1890, May) finds in the granules very delicate connective tissue trabeculæ, lymphocytes, leukocytes, large cells the nature of which he does not know, and phagocytes. His phagocytes, from his description and drawing, correspond undoubtedly to the large cells containing the strange bodies, which I have just illustrated. His idea I think is absolutely fallacious. From what I stated be-

fore, the bodies contained in these cells from their general appearance, form and the deep stain, can not possibly be taken for pieces of nucleoli or protoplasma. Nor is it, I think, possible to think of the process of phagocytosis after having seen some of these cells in which, from the large number of enclosed bodies, hardly any protoplasma, besides the nucleus, is visible. Of course, this is not so apparent in sections of the hardened granule, while it is easily seen in the smear specimen. If there is any phagocytosis, I believe it is in the reverse direction. I think these bodies grow within and eat up, so to speak, the cell that harbors them and then wander away.

Leber (Report of the Heidelberg Ophthalmological Society for 1896) has also given especial attention to these large cells containing strange bodies. He, also, does not believe that they can be phagocytes. In want of a better descriptive name he calls them "Kœrperchenzellen" (corpuscle cells), and he states that he, too, never missed them. He describes the form of what he calls the nuclei of these bodies as hood-like, and also states that the bodies are spherical, although a part of the sphere takes up but little stain. He has also thought of the possibility of a parasitic nature concerning these bodies, but has discarded it, because he saw similar bodies in the lymph follicles of the rabbit's conjunctiva. Leber describes further a number of larger cells with one nucleus, which are remarkable for the deep stain. I suppose, they are the cells which I take to be the oldest bodies wandered from their original home. Then, he mentions crescent-shaped cells which, as he states, are always so situated, that their concavity looks towards the surface of the conjunctiva. Since he seems to have studied the tissue of the granules in sections chiefly or only, it is not astonishing that I have in my method of research not seen everything as he did and I have never come across such cells.

At the Twelfth International Congress in Moskow last summer, A. Petersen read a paper containing "Contributions to the Pathological histology of the Conjunctiva" (*Centralblatt für Augenheilkunde*, November, 1897). In this he at great length describes club- and spindle-shaped bodies and long threads, which take up all the nuclear stains. He studied these in sections and by pressing a fresh specimen on the slide gently with the cover glass. In this manner he sometimes succeeded in isolating the threads and in seeing that a great many of them

were connected with these club-, pear- or spindle-shaped bodies, which formed enlargements at one of the thread's ends. He particularly militates against the idea that these many-shaped bodies are leukocytes, which have obtained their peculiar shapes while wandering and squeezing through between the cells of the granule and its epithelial cover. He finds them, moreover, in all chronic diseases of the conjunctiva From this description, although no drawing accompanies this paper, I can hardly doubt, but that the author here refers to the threads with enlargements at one end, of which I have spoken in the beginning of my description and which I consider to be the result of a mucoid degeneration of cells and nuclei.

There is one more paper which I want to refer to,—"On Plasmodia in Trachoma" (Plasmodienbefunde bei Trachoma), K. Elze (*Berlin, Gebr. Borntræger*, 1897). From the similarity of the climatological conditions under which malaria and trachoma seem best to strive, Elze, like many another before him, drew the conclusion, that the same or a similar cause must bring about both these diseases. He observed, *in one case*, in the secretion, as well as in the granules, certain formations, which he thinks are monads and which he especially likens to the *Trichomonas Batrachorum* and proposes to call plasmodia. He is the more convinced of the correctness of his view, since he has found that quinine will cure trachoma. I am afraid that the preconceived idea helped the author along in the results of his research and its somewhat phantastic description. His drawings surely are far from convincing, neither have I been able to verify his results by employing his own method of observation.

Finally, I want to state here, that notwithstanding all clinical difference between the so-called follicular conjunctivitis and trachoma, all that I have described in the foregoing applies as well to follicular conjunctivitis as to trachoma. Particularly, the bodies which I consider to be parasites, I have always found in follicular conjunctivitis.

THE ANTISEPTIC PREPARATION OF THE CONJUNCTIVA FOR CUTTING OPERATIONS ON THE EYEBALL.[1]

BY B. E. FRYER, M.D., KANSAS CITY, MO.

AT a comparatively recent meeting of one of the foreign medical societies, the matter of ocular antisepsis being under discussion, the remarks of a number of ophthalmologists convinced me that many of those who spoke on the subject understood but little of bacteria or of the effects of supposed bacteria destroyers, and it occurred to me that a consideration of this important matter might well be had here.

The terms antisepsis and asepsis are rather carelessly interchanged by many practitioners and this ought not to be. I would insist, that in most instances surgeons do not—nay, can not make a surface aseptic if we would strictly include in the word asepsis, not alone an absence of septic material, but also an absence of the cause of sepsis, viz., all pathogenic bacteria. And I propose to show how and why this is true.

It is true, as can be shown, however, that by the antiseptic measures the surgeon takes, he may render the microbes attennate, which remain so after the washing and scouring with various soaps and afterwards with ether and following this with sublimate and other solutions, but that some of them still remain in the sub-epithelia as has been proved by Welch, of Johns Hopkins University. I am now, of course, referring to general surgery and general surfaces and not those of the eye. Welch found, be it remembered, that on scraping a surface which had been rendered aseptic (in the generally accepted sense), and on placing these epithelial cells in the culture tube no growth followed; but if the antiseptic used were precipitated, that then there was microbic growth and nearly as much as if no antiseptic had been applied. In other words the antiseptic application had produced, not death of the microbe, but an inertia or restrained condition, and that these microbes were

[1]Read before the Third Annual Meeting of the Western Ophthalmological and Oto-Laryngological Association, held at Chicago, Ill., April 7-8, 1898.

still upon and beneath the superficial epithelial layers. Welch's experiments were made with bichloride of mercury solutions, and the salt was thrown down by ammonium sulphide.

It is well understood, of course, that in antiseptic work on the conjunctiva we can use only very weak solutions of sublimate or of iodide of mercury, and Sternberg states that pus cocci are restrained in their development by 1 : 30000 of these salts.

I believe, in fact I know, that a mercuric chloride solution in the proportion of 1 to 6000 can be instilled in the conjunctival sac every day for weeks without any reaction being produced.

The method of preparing an eye for a cutting operation upon it which I employ is as follows: The face is thoroughly cleansed with soap and water and then the orbital region is washed carefully with a carbolic acid solution, 1 : 50. The eyelids and eyelashes at their roots are especially cleansed. The conjunctival sac is then flushed carefully with 1 : 6000 sublimate solution and a bichloride gauze pad is put over and retained upon the eyelids. This should extend over the brow and nose and down upon the temple and cheek. The dressing is changed daily, and daily the eyelids, brow and cheek are washed with carbolic acid solution and the gauze renewed. Latterly, in the beginning of the antiseptic preparation, I have instilled protargol solution (1 per cent.), say for four or five days, and at the end of that time dropped in the mercuric chloride solution. I find in certain cases, especially in those patients who, from having prostatic trouble, and who void more or less pus with their urine, are liable to infect the eye or have infected it, that the protargol seems to stop the pus flow from the conjunctival sac readily and also removes the conjunctival congestion. These prostatic cases require greater care in preparation for eye operations than is usually given them even by those who are believers in correct antisepsis; many of the cases have pus cocci in their conjunctivæ which cocci, while they have only an innocent surface lodgment, will, however, produce purulent destruction of an eye if admitted unrestrained into the globe. The protargol does admirable work in this class of cases early in the antiseptic preparation. I carry on daily the antiseptic applications and dressings until no yellow discharge is found either at the canthi, on the lid mar-

gins, or on the antiseptic gauze. This may take many days, but the delay is compensated for by the reduction of risk of infection at the time of any cutting operation on the eye. Of course there are circumstances which may preclude any delay and demand an immediate operative measure; under such conditions we must do the best we can by the thorough flushings of the conjunctival sac with the appropriate germicide. Operations for glaucoma permit, of course, no delay, but most cataract extractions do. At the time of operation, after the last drop of sterile cocaine is instilled, a final flushing of sublimate is done and the operative measure follows at once.

I am well aware that there is nothing new in this method —I simply claim that the prolonged preparation is new and is based on facts well known to bacteriologists. I believe we can by following this method restrain the pathogenic microbes in *the conjunctiva* as they are restrained in *the derma*, and sufficiently long to allow of healing before the restraint is removed by the germicide's final removal or elimination.

I have microscopically demonstrated streptococci from the conjunctivæ of eyes which were to be operated and in which streptococci were so attenuated in power by the continued antiseptic preparation that no bad result followed the operation.

Of course the condition of the nares must be looked after and I have found that a weak solution of iodine tincture in albolene used as a spray does good work in attenuating microbes in the nasal cavities.

I need say nothing of the instruments; there is very little difference of opinion as to the methods of their sterilization. I might add that the use of boric acid in antiseptic preparations anywhere is but lost time, it is not a germicide, and it is not even a microbic restrainer.

I had planned a number of experiments both on the human conjunctiva and in those of animals, but a severe illness, lasting several months, interfered. I propose, however, in the near future a complete series of experimental research, both as to the attenuation of microbes in the conjunctiva by weak solutions of sublimate, as to how long the attenuation will last in healthy human and animal conjunctivæ, and further, how long afterward the mercuric chloride remains permeate in and among the epithelia after instillations. We know, of course,

that silver nitrate when applied to the lids for a long period produces a permanent deposit in the epithelial cells, which deposit is reproduced as each cell is reproduced.

ROTATION OF AXIS OF ASTIGMATISM DURING OPHTHALMOMETRIC EXAMINATION.[1]

BY L. R. CULBERTSON, M.D., ZANESVILLE, OHIO,

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THE alteration of the axis of astigmatism when binocular vision is in convergence has been termed "binocular astigmatism" by my father, the late Howard Culbertson, M.D. (See article, "Binocular Astigmatism," by H. Culbertson, in AMERICAN JOURNAL OF OPHTHALMOLOGY, June, 1888, also the Transactions of the American Medical Association, 1888).

In using the Javal–Schiötz ophthalmometer (model 1889), I have noticed a number of times that while the patient was fixing his gaze on the tube the ball seemed to rotate slightly from the vertical, either to the right or left, and then fix and remain stationary. As soon as it became stationary I would give the axis thus found. I did not pay much attention to the cause of this until examining two unusual cases.

CASE 1.—Mrs. A. L., aged 42 years. I did not test the muscle balance, but examined with Javal astigmometer. I had examined her eyes two years ago and found the axes of astigmatism to be 90°, and she had been wearing sphero-cylinders constantly with axes 90°. She now complains that her eyes hurt. I re-examined her with the Javal astigmometer. I took care that her head was level (and remained so) and that the other eye was covered by the ordinary shade. Upon first looking at each eye the axis of each was 90°. As she looked longer at the tube the axis of the right changed to 85°—that is, the upper end of the plane swung in 5°—while the left eye

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changed to 95° (that is the vertical plane swung in 5°). This was probably due to the action of the superior obliques, or to a weakness of the inferior obliques. After repeated trials with the shade and without shade over one eye the eyes invariably fixed at 85° and 95°, respectively. On placing correction before each eye and with both together vision was best with axes at 85° and 95°. Correction given was

R. E., +8. D. sp.⌒—2. D. cyl ax. 175°=$^{5}/_{XX}$;

L. E., +5. D. sp.⌒—.75 D. cyl. ax. 5°=$^{5}/_{IX}$. V. 2=$^{5}/_{VIII}$.

She has been wearing these glasses several months and makes no complaint.

CASE 2.—Mr. J. G. F., aged 60 years Was operated on both eyes several months ago for glaucoma, also, has incipient cataracts. The head was placed squarely on the chin and the forehead rests, and a shade put over the left eye. On first adjusting the instrument the axis was +6.5 at 90°, but gradually the ball rotated on its vertical plane outward 15° making axis 105°. While the other eye rotated out to 75°, the same results were obtained with both eyes uncovered during examination. On making remote vision test

R. E., +6. cyl. ax. 30° (!) V.=$^{5}/_{XXX}$, and V. prox. R. E., + sp. ⌒ + 6. cyl. ax. 165° = Jaeger X. Axis 30° gave the best vision both remote and proximal.

L. E., + 6. cyl. ax. 165° = large objects only.

Various combinations of sphero- and crossed-cylinders were tried on the right eye without benefit. Whether the change in the axis from 105° to 120° in the right eye was due to further swinging outward of the vertical plane; or to astigmatism of the lens resulting from cataractous refractive changes, I do not know. (Crossed-cylinders did not improve vision).

Given a case similar to the above in which the axis in one or both corneæ is altered while under observation, will we set the cylinder at the axis first found, or at the axis caused by the muscular imbalance? I would answer, to make the test under full mydriasis by retinoscopy and ophthalmoscopy; then by test-types monocularly and binocularly. Then give the axis found by monocular examination with the test-types while fully atropinized. If this axis should differ from that found by binocular examination on the test-types and should cause the floor or book to tilt have the patient wear the glasses

anyway, because if there be muscular imbalance of the obliqui or recti, when the strain has been taken off the ciliary muscle the chances are that these muscles will regain their tone and hold the vertical plane in the proper line and thus coincide with the axis of the cylinder given. My belief is that if the axes were rotated in or out by muscular imbalance, and if cylinders were placed at the meridians that would be the proper ones if there were no muscular imbalance, that the distorted image falling on the retina would through reflex stimulation cause the obliqui or recti at fault to perform their proper function and thus rotate the eyes to correspond with the axes of the cylinders given, just as decentering a lens will cause a heterophoric eye to rotate in or out. Any heterophoria should be corrected by prisms or operation.

Of course, if we find that the wearing of glasses for some time, and the exercise by prisms, or an operation, does not cause the eyes to rotate into the normal vertical plane, and the floor or walls slant, or objects are distorted, then the cylinders should be changed so as to correct the binocular astigmatism and not the monocular astigmatism.

Another plan would be to give the axes as found by binocular examination and after these have been worn for some time give the axes found by monocular examination.

Several interesting articles have been written on "Binocular Astigmatism." The first that I can find is by my father, H. Culbertson, who held to the binocular correction theory (Transactions American Medical Association, 1888, also AMERICAN JOURNAL OF OPHTHALMOLOGY, 1888). I can not recall the name of the writer but think it was either Dr. Burnett or Dr. Savage, who, several years ago, wrote a very interesting article on the subject and was in favor of giving the correction as found by monocular test. (I have lost the journal containing the article).

Dr. H. Culbertson (Transactions American Medical Association, 1888) also contends that the phenomena of binocular astigmatism might be due to irregular action of individual sectors of the ciliary muscle or muscles.

Another very important point in test-type examinations to be remembered is that in high grades of astigmatism when the cylinder is placed at the proper axis or axes objects appear slanting or distorted. This is due to the fact that by custom and the association of ideas from infancy the image of

objects which are distorted on the retinæ appear to the mind's eye as being straight, but when the cylinders are adjusted the images are straight on the retinæ but appear crooked to the mind's eye as they have never been seen straight before. In these cases objects appear distorted for awhile but soon appear straight owing to the fact that new brain cells for the memory of the object are created which are connected with the old brain cells and by this association the objects appear straight, just as an infant is taught through the association of ideas that it can not grasp the moon.

I conclusion I will say, that I tested the ophthalmometer with a spirit-level and plumb line and found it strictly accurate.

ADDITIONAL PAMPHLETS RECEIVED.

"The Proportion of Curable Cases in Strabismus," by Dr. L. de Wecker.

"Diseases and Injuries of the Sixth Nerve," by J. H. Thompson, M.D.

"Twenty-Ninth Annual Report of the Brooklyn Eye and Ear Hospital," 1898.

"Twenty-Ninth Annual Report Manhattan Eye and Ear Hospital," 1896 and 1897.

"The Question of Sign-Language and the Utility of Signs, Etc.," by A. Graham Bell.

"Keratectasia, Report of a Case, With Transparent Cornea," by F. C. Todd, M.D.

"The Asheville Plateau in the Mountains of Western Carolina," by S. W. Battle, M.D.

"The Non-Surgical Treatment of Boils, Carbuncles, and Felons," by L. D. Bulkley, M.D.

"Tuberculosis of the Iris and Ciliary Body With Staining of the Bacilli," N. J. Weill, M.D.

"A Contribution to the Study of the Dynamics of the Ocular Muscles," by J. M. Bannister, M.D.

"A Case of Bilateral and One of Monolateral Mastoid Disease; Recovery," by L. R. Culbertson, M.D.

"Amblyopia From Suppression, Congenital Imperfection or Disuse; Which, or All?" by Leartus Connor, M.D.

"A Study of the Ophthalmic Changes in Chlorosis, Pernicious Anæmia and Leucocythæmia," by Ch. A. Oliver, M.D.

SOCIETY PROCEEDINGS.

THIRD ANNUAL MEETING OF THE WESTERN OPHTHALMOLOGICAL, OTOLOGICAL, LARYNGOLOGICAL AND RHINOLOGICAL ASSOCIATION.

MEETING HELD AT CHICAGO, ILL., APRIL 7 AND 8, 1897.

REPORTED BY ADOLF ALT, M.D., ST. LOUIS, MO.

The Western Ophthalmological, Otological, Laryngological and Rhinological Association held its third annual meeting on April 7 and 8, in Chicago, Ill. The beautiful and spacious rooms of the Chicago Medical Society were a most appropriate place for such a gathering. Altogether this meeting of the Association was not only the most successful as regards the members and the character of the men in attendance, of the papers presented and the discussions following them, but also on account of the large accession of new and desirable members.

The most hearty welcome accorded to the Association by our Chicago confrères, the most liberal and enjoyable enterments offered by them, as well as the general spirit of mutual good will, made this meeting a most delightful one.

The Association was welcomed by Dr. F. Henrotin, the President of the Chicago Medical Society, instead of Dr. E. L. Holmes, who was unfortunately detained by illness. This was followed by a response by Dr. A. Alt. In a joint session the members then listened with great enjoyment to the most admirable and extensive address by Dr. H. Knapp, of New York, on "The Radical Tympano-Mastoid Operation." This was followed by an address by Dr. H. T. Patrick, of Chicago.

In the afternoon the real work of the sessions was begun, the Association dividing itself into an ophthalmological and an oto-laryngological section. It also changed its name to the

"Western Ophthalmological and Oto-Laryngological Association."

The officers elected for the ensuing year are: President, Dr. J. E. Colburn, of Chicago; First Vice-President, Dr. Wm. Scheppegrell, of New Orleans; Second Vice-President, Dr. Casey Wood, of Chicago; Third Vice-President, Dr. H. Gifford, of Omaha; Secretary, Dr. F. A. Rumbold, of St. Louis; Treasurer, Dr. W. L. Dayton, of Lincoln, Neb.

The place selected for the next meeting is New Orleans, Louisiana.

The following is a condensed report of the work of the Ophthalmological Section.

DR. ALT read a paper on "Recent Researches Into the Histo-Pathology of Trachoma" (see this issue), illustrated by photographs and later on followed by the demonstration ot specimens.

DR. GIFFORD had at one time thought he had found a plasmodium in trachoma, but found he was mistaken.

DR. WILKINSON, of El Paso, Texas, stated that high altitude must be unfavorable to this disease, as he had only seen two cases in one and a half years.

DR. ALT stated that, it being illegitimate to infect man with this disease for experiment's sake, it is, of course, impossible to absolutely prove that the organisms, described by him, are really the trachoma parasites He stated further, that some of his specimens were taken from dark negroes and offered as a probable explanation of the comparative immunity from trachoma, as proven by Burnett and others, the fact that the negro seems to be provided with accessory lachrymal glands in a much more liberal manner, than the white races.

DR. H. GIFFORD (Omaha) detailed five cases of Parinaud's conjunctivitis, monocular conjunctivitis characterized by granulomata, sometimes pedunculated, and ulcers and small abscesses between them, combined with fever and glandular swellings and even abscesses of the lymph-glands of the same side of the face. He thought Parinaud's idea, that the disease is due to animal infection is based on scant grounds. If left alone the disease heals in from four to six weeks. The granulations showed nothing particular under the microscope. Clipping off of the granulomata and cauterization of the ulcers

and abscesses gave the best results. No serious affection of the cornea has been observed.

DR. J. M. BALL (St. Louis) reported a case of quinine blindness from a dose of 60 grains of quinine.

DR. ALT asked after the final results, as he had seen bad final results years after such patients had apparently been cured.

DR. B. E. FRYER and DR. H. KNAPP stated that they had been able to follow up several cases, in which the cure had remained unchanged.

DR. H. GIFFORD saw one case fourteen years later and found a general improvement had gradually gone on in vision, the field, however, was concentrically limited.

DR. A. C. CORR, living in a malaria district, had given quinine in very large, sometimes enormous doses, and has never seen any toxic effect produced in the eyes. He thinks it is only a coincidence.

DR. B. E. FRYER (Kansas City) read a paper on "The Antiseptic Preparation of the Conjunctiva for Cutting Operations of the Eyeball" (see this issue). This paper was discussed by Drs. Wescott, Knapp, Dayton, Alt, Prince, Culbertson, Dickinson and Corr. One gentleman stated, that instead of using local antisepsis he prepares his patients with great satisfaction by the internal exhibition of mercury and iodide of potassium for several days previous to the operation.

DR. T. A. WOODRUFF (Chicago) read a paper in which he described De Zeng's refractometer and protested against the attempts, at present made, to foist this instrument on the profession and the opticians at an extravagant price.

DR. ALLPORT and some other gentlemen thought it quite a useful instrument.

DR. REYNOLDS (Louisville), in his paper, protested against all such instruments for measuring refraction and examines his cases always under homatropine, which he considers perfectly satisfactory in about 90 per cent. of the cases, and said that atropine, besides causing toxic effects, is not always able to relax the accommodation fully. The main point is to use the homatropine strong enough. He uses 24 grains to the ounce.

The discussion on this paper was very spirited and joined in by most of those present. The experiences related were of the most different kind. However, the general verdict seemed

to be that homatropine is much less reliable as a cycloplegic for refractive examination, than atropine or scopolamine.

Dr. C. Barck (St. Louis), reported a series of ten extractions of immature senile cataract (see next issue), with small iridectomy.

The paper was discussed by Drs. Alt and Reynolds.

Dr. A. E. Prince (Springfield, Ill.), recommended the excision of the tarsal tissue for extreme non-cicatricial ectropium of the lower lid and related cases. (See next issue).

Dr. F. Allport (Chicago), offered a test-card to be used by school-teachers, with very practical simple rules for conducting such examinations.

Dr. J. O. Stillson (Indianapolis), read a paper in which he gave a résumé of all theories on and attempts at curing detachment of the retina and related his experience with multiple galvano-cautery punctures. (See next issue).

Dr. L. R. Culbertson (Zanesville, O.), offered a paper on the rotation of the axis of astigmatism during ophthalmometric examination. (See this issue).

The report of a very interesting case of homonymous hemianopsia followed by total loss of vision in a case of uterine hæmorrhage due to fibroid tumor was read by Dr. A. R. Amos, of Des Moines. (See next issue).

Another most interesting case of angio-sarcoma of the orbit, with metastases in the skull, all abdominal organs and marrow of the long bones, with beautiful illustrations, was reported *in extenso* by Dr. H. V. Würdemann, of Milwaukee.

Finally, Dr. A. C. Corr (Carlinville, Ill.), related a number of cases of choroiditis and choroido-retinitis in young people, due to asthenopic strain.

The evening session was devoted to the presentation of specimens and cases by several Chicago gentlemen.

Dr. C. H. Beard (Chicago), showed a collection of paintings of ophthalmoscopic subjects which, by their excellence, excited the admiration of all.

Dr. Wuerdemann showed a collection of pathological specimens mounted in formaline jelly.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

HENRY EALES, M.R.C.S., Vice-President, in the Chair.

THURSDAY, JANUARY 27, 1898.

Epithelial Xerosis of the Conjunctiva.—MR. SYDNEY STEPHENSON made a communication upon this ailment, which he said was not uncommon in England, since among 6,209 children he had found no fewer than 1.87 per cent. affected. At particular places the examples of xerosis ranged from 0.66 per cent. to 9.47 per cent. After describing the appearances and bacteriology of the affection, the author passed on to consider its relationship to night blindness, which he regarded as something more than merely accidental. He pointed out that xerosis, in the absence of hemeralopia, was supposed to give rise to no symptoms beyond such as were presented by the conjunctiva. He had found, however, changes in the visual field—namely, (*a*) a reduction in size and a transposition of the red and green fields, and (*b*) a slight contraction in the limits of the field for white. The former was constant, the latter not always present. The retinal reflexes in these cases appeared also to be exaggerated. Mr. Stephenson concluded that every eye with epithelial xerosis was in a state of torpor retinæ. In discussing the causes of xerosis he laid stress on two factors—first, lowered nutrition, and, secondly, dazzling by bright light. Most of his patients suffered from internal otorrhœa, hypertrophied tonsils, peripheral vascular opacities of the cornea, relapsing pustular eruptions of the face or scalp, or other signs of "scrofula" or tubercle. Hæmoglobin, according to Mr. Stephenson, was always reduced in amount, averaging in his cases of xerosis 65 per cent. of the normal, as tested by Gower's hæmoglobinometer. As the conjunctival changes disappeared the proportion of hæmoglobin rose, but never to normal. This led him to inquire whether among children it was always below par. In conjunction with Mr. G. C. Burton he examined 164 healthy children, with the result that it was found to vary from 65 per cent. to 95 per cent., and to average 76.62 per cent. of the normal. Mr. Stephenson fur-

ther claimed that in xerosis the red blood cells were sometimes reduced in number. As to treatment, he strongly recommended iron, preferably in the form of Blaud's pills. Mr. Stephenson quoted a number of cases, and illustrated his paper by cultivations and microscopical preparations of the xerosis bacillus.

MR. ARNOLD LAWSON spoke of the resemblance which the bacillus of xerosis bore to the Klebs-Loeffler bacillus of diphtheria; the remarkable thing about it was its inertness, as it was so plentiful and swamped all the other bacilli.

MR. BREUER said that constitutional ailment and not the xerosis was the cause of the symptoms in this disease. In one case in which a post-mortem examination was made xerosis of the liver was found, bile acids dissolved the visual purple, and there might have been some relationship between the night blindness and the altered function of the liver.

MR. EYRE had attempted by raising the pathogenicity of the xerosis bacillus by varying the conditions of growth, and by injecting toxin to impair the resistance of the subject, to produce some effect by injecting it, but all his results had been negative, the bacillus remained inert.

DR. DRAKE-BROCKMAN had seen a great deal of this affection in the East and was glad to find his own observations in every respect confirmed. It was especially frequent in badly nourished children or those affected with tubercle or syphilis, or the subjects of intestinal parasites; it occurred among adults during famines. He found iron preceded by the removal of intestinal parasites the best treatment.

On the Function of the Rods of the Human Retina.—This paper was read by MR. A. BREUER, and dealt with the new theory of von Kries regarding the function of the human visual apparatus. He described experiments of his own, which tended to confirm the statement, that the function of the rods differed from that of the cones. By means of experiments after adaptation of the eye for dark he demonstrated that the sensibility of the periphery of the retina for feebly illuminated objects was very much greater than that of the macula. Under these conditions (dark adaptation) the macular part of the visual field was represented by an absolute scotoma, the exact extent of which was found to vary according to the intensity of the

illumination employed. The weaker the illumination and the longer the adaptation of the eye for the dark, the greater this area became. Other experiments made by von Kries illustrated the same fact. He found, for instance, that color equations found by direct fixation and in a strong light no longer held good with peripheral vision under feeble illumination. These changes, moreover, were most marked when employing lights of short wave length. All these points were modified examples of the well-known phenomenon of Purkinje, who showed first, that when blue and red objects of equal luminosity were selected, the blue gained considerably in brightness as the eye was longer adapted for the dark. This difference, however, as von Kries has shown, did not take place in small fields which fell entirely within the macula. Hence it was clear that the functions of the periphery of the retina and the macula were distinct. Other authorities attributed these differences to the presence of the yellow pigment in the macula. Mr. Breuer detailed an experiment, which proved that this assertion was not supportable. Further, Mr. Baeuer, in a paper published in *Zeitschrift für Physiologie und Psychologie der Sinnesorgane*, Band XIV, measured quantitatively the amount of absorption effected by the macular pigment for spectral lights of different wave lengths, and found it quite inadequate to account for the differences between peripheral and central vision. These and many other observations made it highly probable that the theory of von Kries was correct—namely, that a division of function seemed to exist between the apparatus connected with rods and cones respectively. According to him the latter, the cones, formed a trichromatic apparatus —that was, one capable of distinguishing the spectral colors, and requiring for its exercise higher intensities of light, resulting in greater definiteness and clearness of perception. The rods, on the other hand, constituted an apparatus adapted for exercise of function at far lower intensities of light with the natural drawback of being able only to distinguish between light and dark, and not between colors. Generall speaking it was the cones that were exercised in strong light and the rods in weak. Briefly summed up, this special kind of vision, or the function of the rods, was characterized by (1) its inability to distinguish colors; (2) a very pronounced sensibilty for weakly illuminated objects; (3) a preference for rays of medium

and short wave length; (4) its total absence in the macula.

The Localization of Foreign Bodies in the Eye and Orbit by Means of Roentgen Rays.—MR. MACKENZIE DAVIDSON made a few introductory remarks as to the method of localization of foreign bodies by the Roentgen rays he had recently and fully described in the *British Medical Journal* of January 1, 1898. He then demonstrated the special application of the method for the detection, localization, and estimation of size of foreign bodies in the eyeball and orbit. The patient was seated upright, and his head fixed in a rectangular rest. The photographic plate was placed against the temple of the affected side behind cross wires. A lead wire was made to touch the edge of the lower eyelid opposite a known point on the eye, and the patient fixed his eye on a distant object during the exposures. These were made in the same way as for other parts of the body, and the interpretation of the skiagraphs was carried out by the use of the "cross-thread localizer."

MR. TREACHER COLLINS then gave a description of four cases in which this method had been applied. In none of them could the presence of a foreign body be certainly determined from the clinical appearances. In two of the cases the chip of steel was subsequently withdrawn by the introduction of an electro-magnet in the direction in which it had been ascertained to lie. The size of one of these bits of steel was practically the same as had been estimated previous to its removal. In another case, the eye being quiet, and two months and a half having elapsed since the injury, operative procedure was not thought justifiable. In the remaining case, which was the first they had dealt with before they had obtained sufficient experience of the method, the foreign body was found to lie in the orbit when they thought it was lodged in the eyeball. Mr. Collins also mentioned three cases where the presence of a foreign body in the eye was suspected in which they had by means of the *x*-rays been able to assure themselves none was there. In one of their patients, in whom a large number of exposures had been made, some loss of hair occurred a month afterwards from the temple which was directed nearest to the tube.

Card Specimens.—The following were the card specimens:

MR. G. HARTRIDGE—(1) Foreign Body Lodged in Eyeball; (2) Rupture of Choroid with Extensive Retinal Pigmentation the Result of a Severe Concussion of the Globe.

MR. LAWFORD—Newly Developed Blood Vessels in the Optic Disc.

MR. ROLSTON—Case of Keratitis.

MR. POULET WELLS—Result of Scraping Calcareous Film of Cornea.

OPHTHALMIC DIGEST.

BY J. ELLIS JENNINGS, M.D.,

ST. LOUIS, MO.

THE TREATMENT OF COMPLICATED ULCERS OF THE CORNEA.—In a paper read before the fourteenth annual meeting of the Medical Society of the State of Pennsylvania, Dr. C. A. VEASEY, of Philadelphia, concludes as follows:

1. Examine thoroughly the conjunctiva, the lachrymal ducts, the nares and naso-pharynx, as well as the cornea itself, and if any abnormal condition be found that is either the primary cause of the ulcer or that is keeping up the condition, direct the treatment against it as well as against the ulcer itself.

2. Employ moist heat by means of the local application of pieces of lint or flannel wrung out in hot water at a temperature of 120° F. from fifteen to sixty minutes at a time, repeating at intervals varying from two to four hours, according to the virulence of the disease.

3. Cleanse the ulcer and the conjunctival cul-de-sac with some warm antiseptic solution immediately after the employment of the moist heat, and between the times of its employment if there be much discharge. For this purpose may be used a saturated solution of boracic acid, a solution of bichloride of mercury (1 : 6000), or a solution of formaldehyde (1 : 4000).

4. Instill a drop or two of a solution of atropine (four

grains to the fluid ounce) once or twice daily if the ulcer be central; but if it be peripheral, a solution of eserine (one-sixth of a grain to the fluid ounce) may be employed from three to six times during the day, and the atropine solution instilled once at night.

5. The eye must be protected by dark glasses or an evenly and lightly applied bandage. As a rule the former should be used in those cases in which there is considerable discharge, the latter in the cases in which very little discharge is present.

6. Should the above means fail to check the progress of the ulcer it should be curetted, and after dusting on its surface some iodoform, previously pulverized and sterilized, a bandage should be applied.

7. Should the ulcer continue to spread, after being curetted, it should be touched with some one of the chemical agents employed for the purpose. Of these the tincture of iodine, iquid carbolic acid, and silver nitrate (the latter in the strength of ten to twenty grains to the fluid ounce) seem to be the best.

8. The actual cautery should be applied after the previously described remedies have been employed without beneficial result, or even before these have been used if it be seen that the ulcer has assumed a malignant type—that is, if the cornea is becoming so rapidly involved that the destruction of all, or a large portion, of its tissue is threatened.

9. Any unhygienic condition, dietetic error, or constitutional diathesis should be corrected.

LESIONS OF THE RETINAL VESSELS, RETINA AND OPTIC NERVE, ASSOCIATED WITH GOUT.—From a clinical study of fifteen cases DR. CHARLES STEDMAN BULL, of New York (*The Medical News*, May 8, 1898), draws the following conclusions:

1. The changes in the fundus are always bilateral though rarely symmetrical in the two eyes. The lesions may begin simultaneously in the two eyes, but this is by no means always the case.

2. The degenerative changes in the walls of the blood vessels, both arteries and veins, are at first very minute, and are often overlooked. They must be carefully searched for, as they begin in the intima.

3. The general angiosclerosis, and the patchy exudation in the retina, cause marked impairment of central vision, but little impairment of the peripheral vision, and the disease never ends in blindness.

4. The loss of central vision is always progressive up to a certain point. Improvement of the vision, after the retinal disease is established, can not be expected, though in favorable cases the existing vision may be maintained.

5. Hæmorrhages into the retina are rare except in the comparatively early stages of the disease. When the vessels lose their elasticity by reason of the increase in the thickness of their walls, due to the deposits, the vessels become stronger and more rigid, and hæmorrhages are no longer to be feared.

6. The most marked feature in the ophthalmoscopic picture is the development of the angiosclerosis in the vessels of the retina. This condition is confirmed by the microscope, and is seen to extend to the vessels of the optic nerve and choroid.

7. Another almost equally marked symptom is the peculiar yellowish granular exudation in the retina, located by the ophthalmoscope around the posterior pole of the eye, and generally leaving the macula intact until late in the course of the disease. This exudation is shown by the microscope to be mainly in the nerve-fiber layer, though found in all the layers except that of the rods and cones.

8. The changes in the optic nerve-fibers seem to be generally intra-ocular, but have been traced occasionally for some distance back of the eyeball.

THE DESIRABILITY OF A PERISCOPIC QUALITY IN CORRECTING LENSES.—In a paper read before the American Ophthalmological Society, May 27, 1897, DR. C. M. CULVER, Albany, N. Y., says that such a quality can and ought to be often obtained. Simple spheric lenses are now-a-days mostly menisci, and are mounted with the concave surface toward the eye. In cases of compound astigmatism, however, the prescriber is apt to combine the spheric lens that corrects the ametropia of the least ametropic meridian with the cylindric lens that corrects the astigmatism, of itself, making the latter concave when the eye is myopic in all meridians,

and convex when the eye is hyperopic in all meridians. In the case of an eye that is hyperopic by 1.00 D. in its vertical meridian, and by 2.00 D. in its horizontal meridian, the usual prescription would be:

Sph. + 1.00 ⌒ cyl. + 1.00, axis vertical.

A better form of lens, having the same optical power, but being at the same time periscopic, has the formula:

Sph. + 2.00 ⌒ cyl. — 1.00, axis horizontal.

In case the eye is myopic by 1.00 D. in its horizontal meridian, and by 2.00 D. in its vertical meridian, the usual formula is:

Sph. — 1.00 ⌒ cyl. — 1.00, axis horizontal.

A better one reads:

Sph. — 2.00 ⌒ cyl. + 1.00, axis vertical.

The foregoing are but type cases, and the application of the principle involved may be made to manifold combinations of hyperopia, myopia and emmetropia. In cases of simple astigmatism it is better to prescribe a compound, periscopic lens than one having only a plano-cylindric combination. Instead of:

Cyl. + 1.00, axis vertical,

it is better to write:

Sph. + 1.00 ⌒ cyl. 1.00, axis horizontal.

Instead of:

Cyl. — 1.00, axis horizontal,

it is better to write:

Sph. — 1.00 ⌒ cyl. + 1.00, axis vertical.

While the formula for a correcting lens, prescribed according to what is here recommended, does not show at first glance the character of the ametropia present, it requires but a moment's thought to determine whether the concave or convex element is preponderant.

THE PREPARATION OF MACROSCOPIC PHOTOGRAPHIC ILLUSTRATIONS. — In an article entitled "Illustrative Cases Showing the Indications for Enucleation of the Eyeball With Macroscopic and Microscopic Photographic Illustrations From Specimens," DR. H. V. WUERDEMANN, of Milwaukee (*Annals of Ophthalmology*, Vol. VI, October, 1897, No. 4), explains the method of preparing macroscopic illustrations as follows:

Wash blood from the enucleated eye and place in a 5 per cent. solution of formalin for a few days; wrap in gutta percha tissue- or wax-paper; freeze in mixture of rock salt and chipped ice; cut with razor or scalpel. Place for twenty-four hours in a 33 per cent. solution of glycerine and water; then in 50 per cent. glycerine and water for twenty-four hours more. Mount in special jar, cell downward, in glycerine jelly (and remove bubbles by pipette) which is made in the following manner: Soak 1 oz. "Gold Label" gelatine in 8 ozs. water for twenty-four hours; add shells and whites of two eggs and boil over water bath for twenty minutes, stirring constantly; filter and add equal amount of glycerine; add a few drops of carbolic acid to preserve until wanted for use. Expose to fumes of formalin under bell-jar for twenty-four hours to harden the jelly permanently. Seal cup by cementing on the glass cover.

Wishing to exactly reproduce the eye sections, I endeavored to have photographs made, but found that no ordinary exposure would sufficiently elaborate the detail. When it is borne in mind that the bottom of an half eye is nearly half an inch from its cut edge or periphery, it is seen that these lie in different planes, and no ordinary lens or exposure will give a sufficient depth of focus for proper expression of the detail in the negative or print. Such may only be obtained by exceedingly long exposures, the use of the smallest diaphragms, and a rectilunear lens.

Accordingly, after many trials, the specimen in the jars were exposed to bright sunlight from six to eight hours, a copying camera being used with the smallest diaphragms, a deep orange cell made expressly for the purpose being placed before the objective in order to filter out the heat and non-actinic rays. An orthochromatic plate was used in the holder, and the specimens enlarged one-third. The backgrounds were stopped out in the negative, and the photograph (a platinum print) reproduced (reduced one-third) by the photo-tint process with the excellent result seen in the accompanying figures. Such faithful adherence to the natural appearance of the specimen could not be secured by the brush of the artist.

BOOKS AND PAMPHLETS.

RETINOSCOPY (OR SHADOW TEST) IN THE DETERMINATION OF REFRACTION AT ONE METER DISTANCE, WITH THE PLANE MIRROR. By JAMES THORINGTON, M.D., Adjunct Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine, etc. Second Edition, Revised and Enlarged. Thirty-Eight Illustrations, Twelve of which are Colored. Philadelphia: P. Blakiston, Son & Co., 1012 Walnut Street. 1898.

The appearance of a second edition of Dr. Thorington's work on Retinoscopy within a year is a well-earned tribute to the value of the book. To make this edition more lucid than the first, the writer has carefully reviewed the original text and has added many new illustrations, twelve of which are in colors. A description and drawings of three lenses, suggested by the author for the study of the scissor movement, conic cornea, and spheric abberration on the schematic eye, have been inserted. This work is indispensable to those who desire a simple practical description of the shadow test. J. E. J.

THE EYE-OPERATIONS (DIE AUGENÆRZTSLICHEN OPERATIONEN). By DR. W. CZERMAK. No. XI and XII. Wien, Carl Gerold's Sœhne, 1898. Price, 9 marks.

These numbers of the series previously mentioned and most heartily recommended to our readers, treat on the operations on the iris. We can only reiterate our former praise.

ALT.

PAMPHLETS RECEIVED.

"Hemianopsia," by W. Harris, M.D.

"Authors and the Journals," by S. S. Bishop, M.D.

"Clinical Tests of New Remedies," by S. S. Bishop, M.D.

"Note on Diastatic Preparations," by W. G. Tucker, M.D.

"The Antitoxin Treatment of Tuberculosis," by Ch. Denison, M.D.

"Solution of the Proprietary Medicine Problem," by C. C. Fite, M.D.

"Asheville Sanatorium," by S. W. Battle, M.D. and J. W. Ross, M.D.